

Answer to suggestions from the Editor

Acevedo et al.,

April 25, 2017

Dear Prof. Goosse,

Thank very much for your suggestions. We took them all into consideration for the last version of our manuscript, as you can see in the following suggestion/reply list. Additionally, we made a final effort to improve the readability of the manuscript. We removed unimportant technical details, such as the comparison between prescribed and slab ocean configurations which is not relevant for the focus of the paper, and with that the last 2 sections of the paper got highly improved.

Abstract, Line 9-10: It is not clear to me to which result you refer to in the sentence: ‘the error reduction achieved by assimilating a pseudo-TRW chronologies is modulated by the strength of the yearly internal variability of the model’. Additionally, the word ‘strength’ does not seem appropriate in the sentence.

Here we refer to all our experiments, accordingly we use now “in general” instead of “Additionally”.

Additionally, the word ‘strength’ does not seem appropriate in the sentence. ‘strength’ changed by ‘magnitude’.

Page 1, Line 17. Please specify why ‘paleoclimate modeling ideas have been proposed’. The goal was to solve which problem?

Taken. Middle part of the paragraph refrased: To the present, many different ideas have been proposed in order to link proxy records to the paleoclimate conditions where they were created, e.g., data-driven statistical techniques, climate model hindcasts and Bayesian probabilistic methods (see Crucifix (2012) as a recent review). Among this plethora of approaches, DA methodologies are today particularly appealing as they deliver estimates of paleoclimate quantities, by systematically combining the information of paleoclimate records with the dynamical consistence of climate simulations (Brönnimann, 2011; Hakim et al., 2016).

Page 2, line 2 ‘as reference’. Did you mean ‘for additional references’ or ‘for a review’?

we meant ‘for reviews’. Changed accordingly

Page 2, line 9. Please specify at this stage what you mean by ‘beginning the off-line condition’.

sentence rephrased: *Furthermore, some recent studies have assumed the presence of the off-line condition, and accordingly have removed the reinitialization step after assimilation (Steiger et al., 2014; Dee et al., 2016; Hakim et al., 2016)*

Page 2, line 24. ‘an online EnKF scheme’. If I am right, ‘on line’ has not been defined yet.

Now it is explicitly defined: *These type of DA methodologies will be referred to in this paper as “off-line DA techniques”, in order to contrast them with traditional “on-line DA techniques”, where the state of the model is updated after the assimilation of observations.*

Page 2, line 21. What do you mean by ‘in the realism of DA-based climate reconstructions’ ? Please rephrase

That is an error coming from the editing process, Removed

Page 2, line 28. ‘the both’, suppress ‘the’
Suppressed.

Page 4, line 24. I would not use ‘aspect’ in this context.
Agreed, the beginning of the paragraph was rephrased.

Page 6, Eq. 14. τ and τ_0 are not defined if I am right.
Now they are defined.

Page 10, line 22. ENSO is not an annular mode.
That was a mistake, now removed.

Page 11, line 14. ‘analysis is more evident in the RMSE maps’. I do not see what you refer to here.
That was a mistake, now removed.

Page 11, lines 24-26. ‘However, the use of VSL-Prod instead of VSL-Min appears beneficial to the filter performance for the analysis, as demonstrated in Figure 6b. The expected value of the RMSE shifts significantly toward lower values for VSL-Prod compared to the free ensemble run.’ I do not follow why you first compare VSL-Prod and VSL-Min in one sentence and then VSL-Prod and Free in the next one.

That was very confusing. This subsection was simplified and rephrased. Now we believe it is much more understandable

Page 12, Fig.9. Is figure 9 for the ‘non-cycling’ method? It is not clear from the caption.

All the captions now mention explicitly whether on-line or off-line DA was used.

Finally, we would like to thank you again for the thorough editing process you followed with our paper, which considerably increased the clarity of the manuscript.

Best regards,

on behalf of all the co-authors,
Bijan Fallah